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# PATENT SPECIFICATION

DRAWINGS ATTACHED

1011742



1011742

Date of Application and filing Complete Specification Sept. 24, 1962.

No. 36458/62.

Application made in Italy (No. 17953) on Oct. 3, 1961.

Complete Specification Published Dec. 1, 1965.

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Index at acceptance: —F4 VB2B

Int. Cl.: —F 24 f

## COMPLETE SPECIFICATION

### Improvements in or relating to an Induction Type Room Air Conditioning Unit

## ERRATUM

SPECIFICATION No. 1,011,742  
Amendment No. 1

Page 1, Heading, Date of Complete Specification, for "Sept. 24 1962" read "Sept. 25, 1962"

THE PATENT OFFICE  
15th April 1966

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25 conduit for primary air and disposed within the inlet chamber portion, and at least one primary air delivery conduit in communication with the supply conduit and having nozzles extending into the outlet chamber portion so that air discharged through the nozzle from the delivery conduit will draw secondary air through the inlet means into the inlet chamber portion and then through the heat exchange means into the discharged air for passage therewith through the outlet means, the construction being such that the dimension of the unit in the direction at right angles to the side of the enclosure containing the inlet means is smaller than the dimensions of the unit at right angles to said direction.

30 It is manifest that in the enclosure, which is to be inset behind a wall or above a ceiling, there may also be located other items, for example for lighting or sound broadcasting.

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its other end, near which end it is provided with two openings 1<sup>1</sup> both covered by a V-shaped plate 2 supported in an adjustable position by a screw 3 with a stop spacer 4 and which plate enables the intake of air from said openings 1<sup>1</sup> to be regulated. Connected to this conduit 1 and communicating therewith through the openings 1<sup>1</sup> are two conduits 5 each having a right-angled bend, the portions of conduits 5 lying parallel to conduit 1 being provided with nozzles 6 from which air is directed into two outlet or inductive chambers 7. These chambers, which are closed at their upper and outer sides, as seen in Figure 2, by flat walls, are each bounded at their inner sides by heat exchange coils 13. At their lower sides, as seen in Figure 2, the chambers 7 have air outlets each screened by a respective panel 15 which does not, however, reach as far as the perimetral frame 18, thereby leaving an open zone around the panels 15

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### COMPLETE SPECIFICATION

#### Improvements in or relating to an Induction Type Room Air Conditioning Unit

We, CARRIER CORPORATION, a corporation organised according to the laws of the State of Delaware, of Syracuse, New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an air conditioning unit for positioning in a well or ceiling.

In accordance with the invention there is provided an air conditioning unit for positioning in a wall or ceiling and comprising an enclosure having air outlet means and, at one side of the enclosure, air inlet means, at least one heat exchange means for heating or cooling and dividing the enclosure into an inlet chamber portion communicating with the inlet means and an outlet chamber portion communicating with the outlet means, a supply conduit for primary air and disposed within the inlet chamber portion, and at least one primary air delivery conduit in communication with the supply conduit and having nozzles extending into the outlet chamber portion so that air discharged through the nozzle from the delivery conduit will draw secondary air through the inlet means into the inlet chamber portion and then through the heat exchange means into the discharged air for passage therewith through the outlet means, the construction being such that the dimension of the unit in the direction at right angles to the side of the enclosure containing the inlet means is smaller than the dimensions of the unit at right angles to said direction.

It is manifest that in the enclosure, which is to be inset behind a wall or above a ceiling, there may also be located other items, for example for lighting or sound broadcasting.

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For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, wherein:

Figure 1 shows a view from below of an air conditioning unit;

Figure 2 shows a section along the line A—A of Figure 3;

Figure 3 shows a section along the line B—B of Figure 2;

Figure 4 shows a section along the line C—C of Figure 2; and

Figure 5 shows a section along the line D—D of Figure 2.

The air conditioning unit shown in Figures 1 to 5 comprises a primary air supply conduit 1 of substantially triangular cross-section and provided at one end with a connector 24 for joining the conduit 1 to a primary air feed line (not shown). The conduit 1 is closed at its other end, near which end it is provided with two openings 1' both covered by a V-shaped plate 2 supported in an adjustable position by a screw 3 with a stop spacer 4 and which plate enables the intake of air from said openings 1' to be regulated. Connected to this conduit 1 and communicating therewith through the openings 1' are two conduits 5 each having a right-angled bend, the portions of conduits 5 lying parallel to conduit 1 being provided with nozzles 6 from which air is directed into two outlet or inductive chambers 7. These chambers, which are closed at their upper and outer sides, as seen in Figure 2, by flat walls, are each bounded at their inner sides by heat exchange coils 13. At their lower sides, as seen in Figure 2, the chambers 7 have air outlets each screened by a respective panel 15 which does not, however, reach as far as the perimetral frame 18, thereby leaving an open zone around the panels 15

from which the air can issue into a room in a direction almost parallel to the plane of panels 15, i.e. to the plane of the wall or ceiling.

In order to promote this distribution of the air, suitable deflectors 16 are arranged in the outlet or induction chambers 7, and at the outlet zone 19 there is a series of fins 17 arranged substantially on planes radiating from the centre of the unit. Secondary air reaches the chambers 7 through filtering walls 12 and the heating or cooling coils 13. The coils 13 also define, between the chambers 7, a chamber 11 bounded at its lower side, as seen in Figure 2, by a grille 8 resting on the two panels 15 and secured thereto by locking members 23. Behind grille 8 there is fitted a double damper arrangement 10 operated by means of a knob 9 which projects from the front of one of two panels 22 which are continuations of the ends of the grille 8. The arrangement 10 has two dampers pivotable as shown by the dashed lines of Figure 2. On the other of these panels 22 is located a knob 21 controlling a valve 20 fitted on line 30 from heat exchange coils 13.

The numeral 27 indicates two room light diffusers fastened to the panels 15 through holes 28; the numeral 29 indicates a loud-speaker. 25 denoted brackets for securing the unit to a wall or ceiling. In the case of a number of such units arranged in series, a connector 24<sup>1</sup> (Fig. 4) provides for the connection of conduits 1.

From the above description the working of the unit will be apparent. Primary air coming from a central air conditioner is admitted into the unit through the conduit 1, located within the chamber 11, and by, passing through openings 1<sup>1</sup>, feeds conduits 5. By means of the V-shaped plate 2, or by other equivalent means, the quantity of this air is regulated; it can be regulated independently for each of the two conduits 5 for the purpose of sending into two zones of a room air having different thermal and hygroscopic properties to take account of the different conditions which may obtain in two zones of the same room. The primary air then enters chambers 7 through ejector nozzles 6, thus lowering the pressure in said chambers to draw recycled air from chamber 11 through the filtering wall 12 and heat exchange coils 13; this secondary recycled air is deflected towards the outlets of the unit by the current of primary air issuing from nozzles 6, and therefore travels in a direction almost opposite to that in which it entered chamber 11. Deflectors 16 and fins 17 then take care of the deviation of the total air in all the directions extending substantially in a plane at right angles to the direction of intake of the recycled air. On account of this characteristic, the unit can be wholly recessed in a ceiling or wall with the intake and delivery mouths located on one and the same plane.

Notwithstanding this, not only do the two intake and delivery currents not mingle, but the air leaving the unit in a radial direction creates a certain lowering of the pressure in the vicinity of the room side of central grille 8, thus promoting the return of room air to said grille.

The primary air conduit 1 is incorporated in the intake chamber 11; its triangular-shaped cross-section gives rise to a chamber 11 so shaped as to convey, in an appropriate manner, the flow of secondary air towards filtering wall 12. The dimension of the unit in a direction at right angles to the side of the enclosure containing the outlets and the grille 8 is hence particularly small, and is in any case less than the dimensions of the unit at right angles to said direction.

One specific practical advantage of the unit shown lies in the fact that by simply removing grille 8 access can be had to all the regulating means. Consequently the unit can readily be adapted to widely varying requirements; for example it is possible to vary the ratio of primary air to secondary air and to vary this ratio in a different manner on the two sides of the unit so as to give the air an asymmetrical distribution when this is made advisable by the arrangement of the room. It is likewise possible not only to vary the thermal power of heat exchange coils 13 but also to make it different in one from that in the other, thus distributing the heating or cooling in the desired manner and not merely symmetrically. It should also be noted that the unit can be made ready entirely prior to installation and requires only a very simple operation for its fitting.

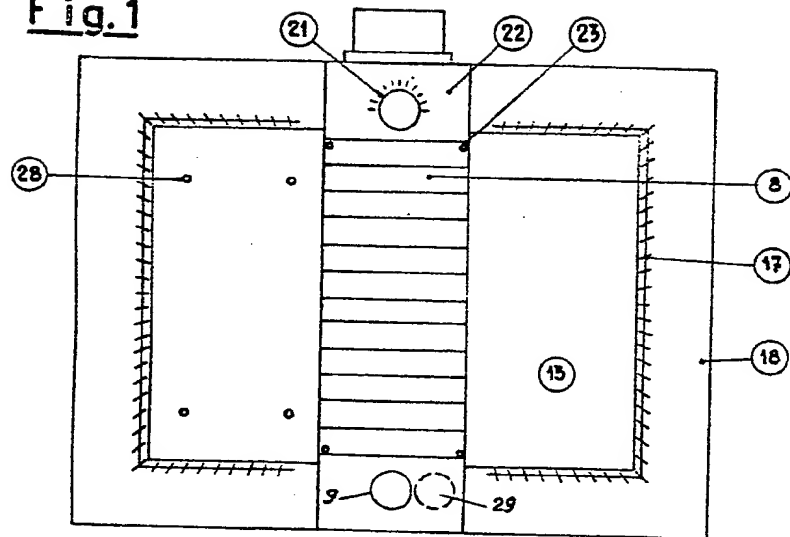
#### WHAT WE CLAIM IS;

1. An air conditioning unit for positioning in a wall or ceiling and comprising an enclosure having air outlet means and, at one side of the enclosure, air inlet means, at least one heat exchange means for heating or cooling and dividing the enclosure into an inlet chamber portion communicating with the inlet means and an outlet chamber portion communicating with the outlet means, a supply conduit for primary air and disposed within the inlet chamber portion, and at least one primary air delivery conduit in communication with the supply conduit and having nozzles extending into the outlet chamber portion so that air discharged through the nozzles from the delivery conduit will draw secondary air through the inlet means into the inlet chamber portion and then through the heat exchange means into the discharged air for passage therewith through the outlet means, the construction being such that the dimension of the unit in the direction at right angles to the side of the enclosure containing the inlet means is smaller than the dimensions of the unit at right angles to said direction.

2. A unit as in claim 1, wherein means are provided for regulating the volume of primary air passing from the supply conduit to the delivery conduit.
- 5 3. A unit as in claim 1 or 2, wherein the supply conduit is substantially triangular in cross-section and is so disposed that two side walls of the conduit will give to the secondary air drawn into the inlet chamber a component of velocity directed towards the heat exchange means.
- 10 4. A unit as in claim 1, 2 or 3, wherein the outlet means and the inlet means lie in a single plane in the same side of the enclosure.
- 15 5. A unit as in claim 4, having means for deflecting the air through outlet means in a direction diverging from the direction of intake of secondary air.
- 20 6. A unit as in claim 4 or 5, wherein the outlet means are provided by two outlet mouths, one at one side and one at the opposite side of the inlet means.
7. A unit as in claim 6, wherein each outlet mouth communicates with a respective one of two outlet chamber portions, one at one side and the other at the opposite side of the inlet chamber portion, each of said outlet chamber portions having a respective delivery conduit communicating with the supply conduit.
- 25 8. A unit as in claim 7, when appended to claim 2, wherein each delivery conduit has respective means for regulating the volume of primary air passing to the delivery conduit.
- 30 9. An air conditioning unit substantially as hereinbefore described with reference to the accompanying drawings.
- 35

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Chancery Lane,  
London, W.C.2,  
Agents for the Applicants.

**Fig.1**



B

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A

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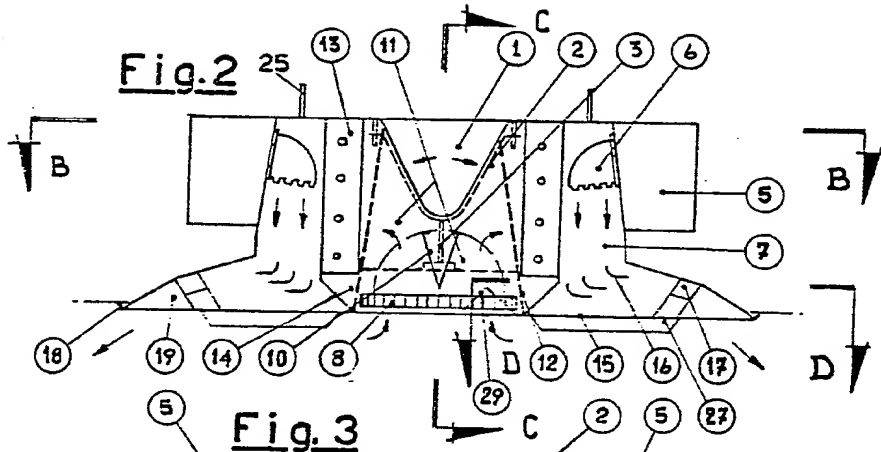
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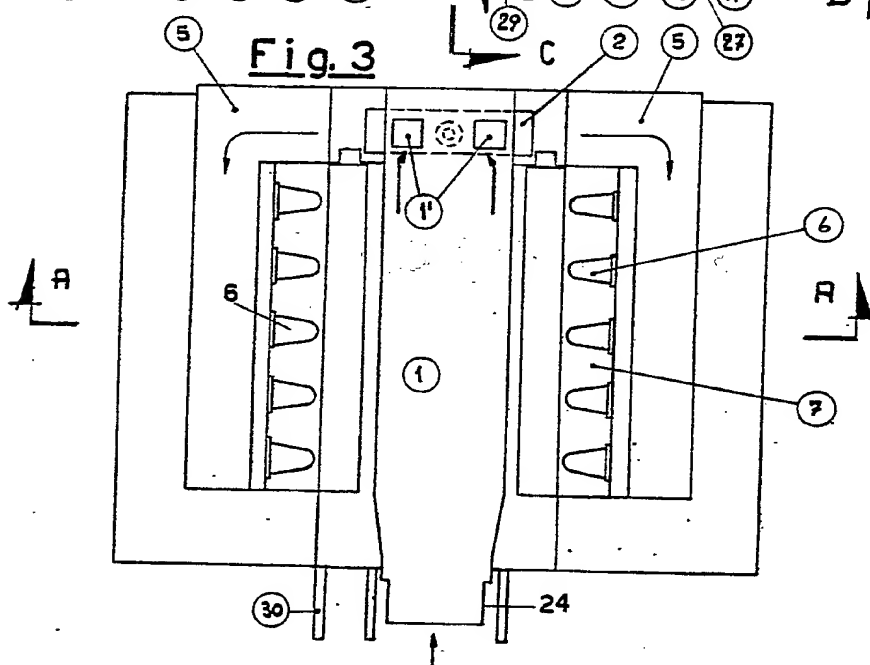
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Sheet 1

**Fig. 2**

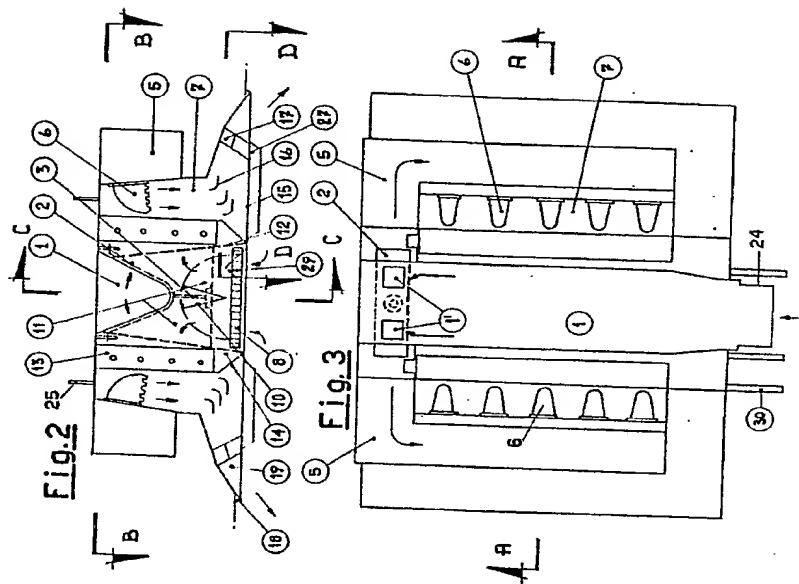
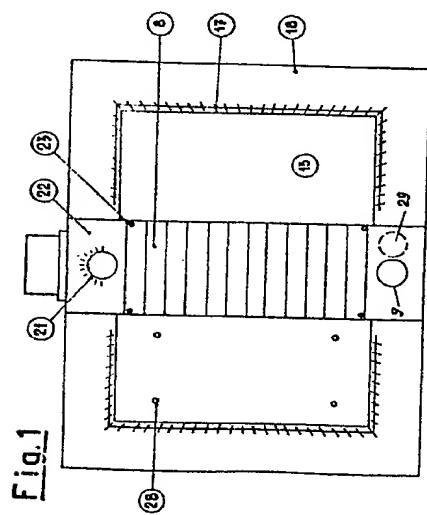


**Fig. 3**



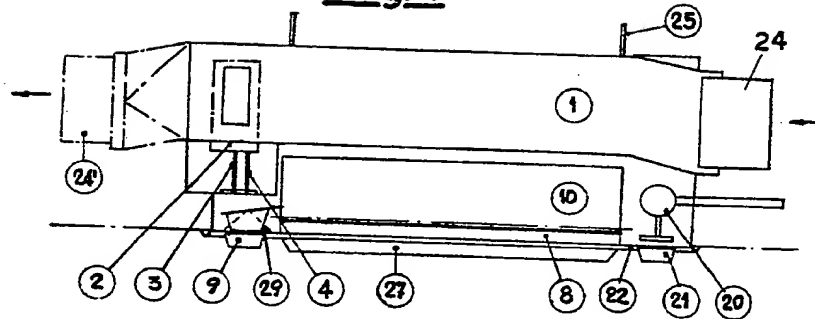
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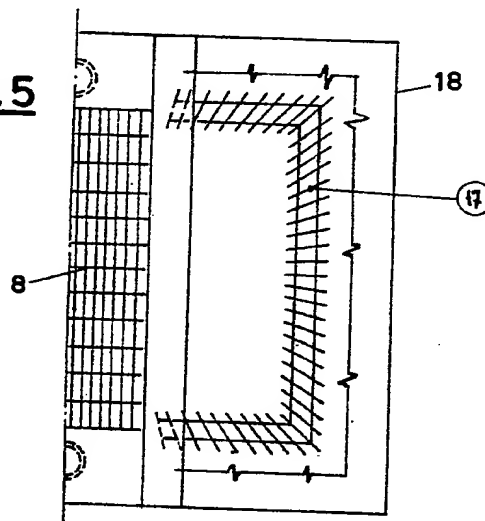


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**Fig.4**



**Fig.5**



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